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(54) **METHOD FOR DOMAIN CONTROL VALIDATION**

(71) Applicant: **Go Daddy Operating Company, LLC**, Scottsdale, AZ (US)

(72) Inventors: **Wayne Thayer**, Phoenix, AZ (US); **Jacob Plains**, Phoenix, AZ (US)

(73) Assignee: **Go Daddy Operating Company, LLC**, Scottsdale, AZ (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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CPC ***H04L 63/10*** (2013.01); ***H04L 63/0823*** (2013.01); *H04L 29/12066* (2013.01)

(58) **Field of Classification Search**
CPC H04L 63/0823; H04L 29/12066
USPC 726/10
See application file for complete search history.

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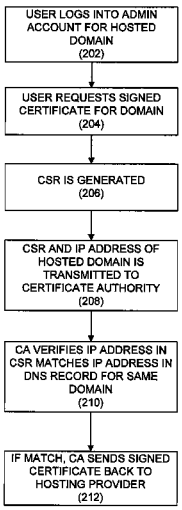
Primary Examiner — James Turchen
(74) *Attorney, Agent, or Firm* — Quarles & Brady LLP

(57) **ABSTRACT**

A system and method for domain control validation is presented. At a certificate authority a request is received. The request includes a certificate signing request and a first Internet protocol address. The certificate signing request identifies a domain and a certificate. A second Internet protocol address for the domain is retrieved from a domain name system. When the first Internet protocol address is the same as the second Internet protocol address, the certificate is signed, and the signed certificate is transmitted to a requester of the request. When the first Internet protocol address is not the same as the second Internet protocol address, the certificate signing request is rejected.

5 Claims, 4 Drawing Sheets



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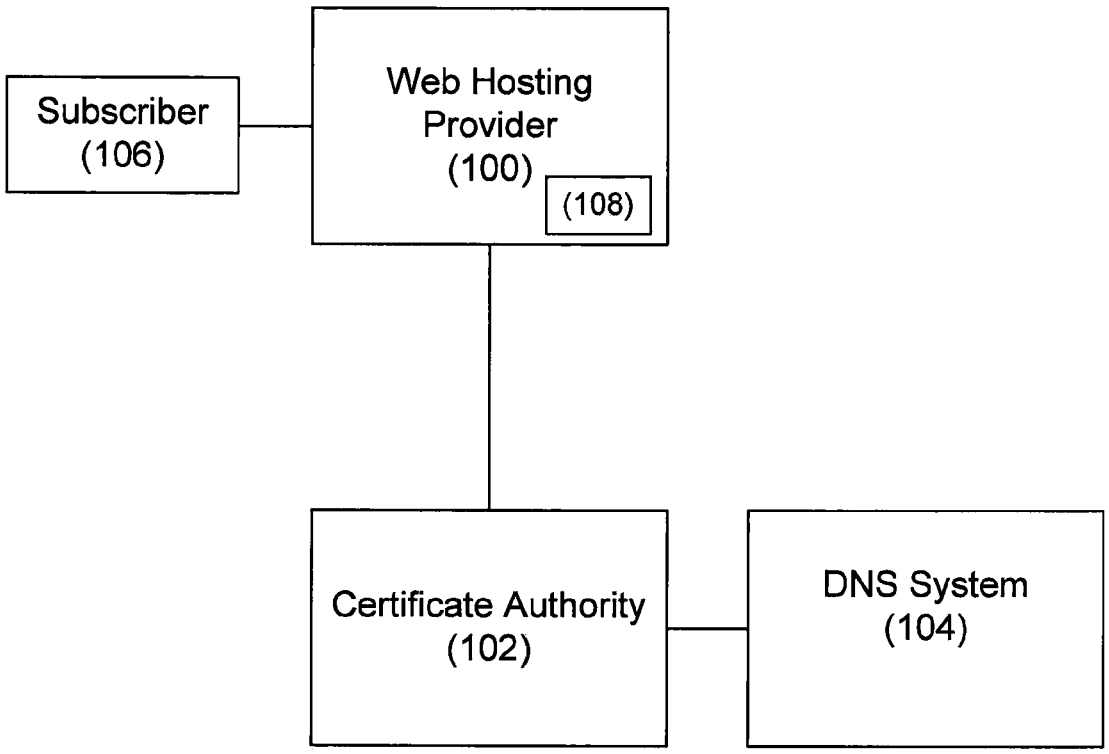
Subscriber
(106)
Web Hosting
Provider
(100)
(108)
Certificate Authority
(102)
DNS System
(104)

FIG. 1

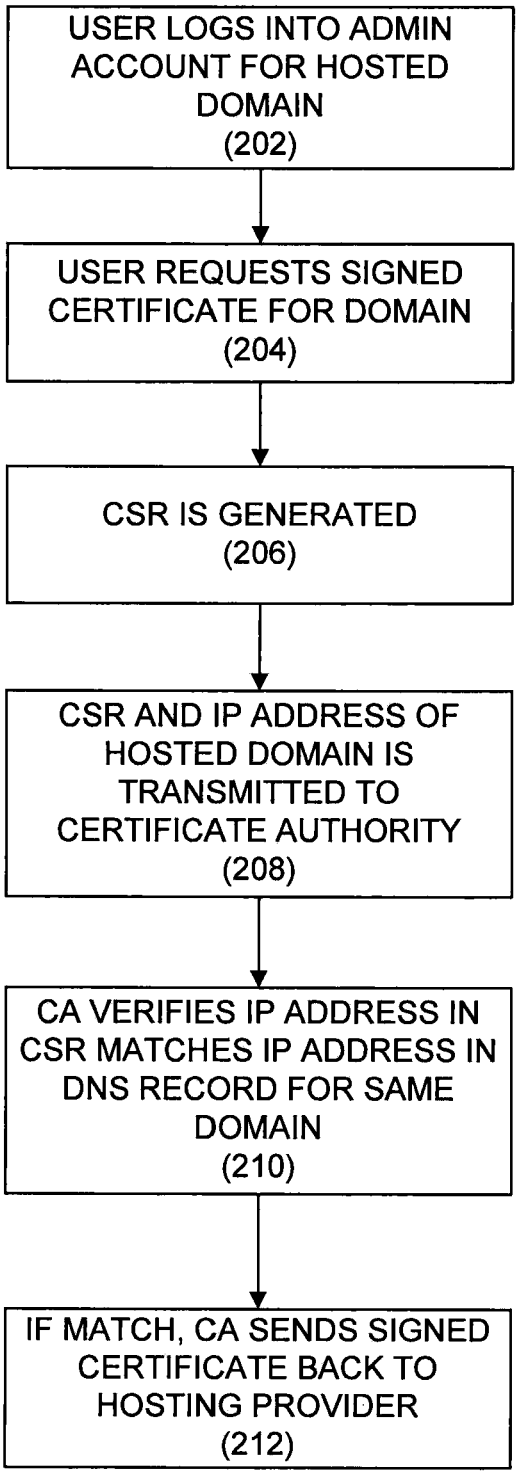
USER LOGS INTO ADMIN ACCOUNT FOR HOSTED DOMAIN (202)
USER REQUESTS SIGNED CERTIFICATE FOR DOMAIN (204)
CSR IS GENERATED (206)
CSR AND IP ADDRESS OF HOSTED DOMAIN IS TRANSMITTED TO CERTIFICATE AUTHORITY (208)
CA VERIFIES IP ADDRESS IN CSR MATCHES IP ADDRESS IN DNS RECORD FOR SAME DOMAIN (210)
IF MATCH, CA SENDS SIGNED CERTIFICATE BACK TO HOSTING PROVIDER (212)

FIG. 2

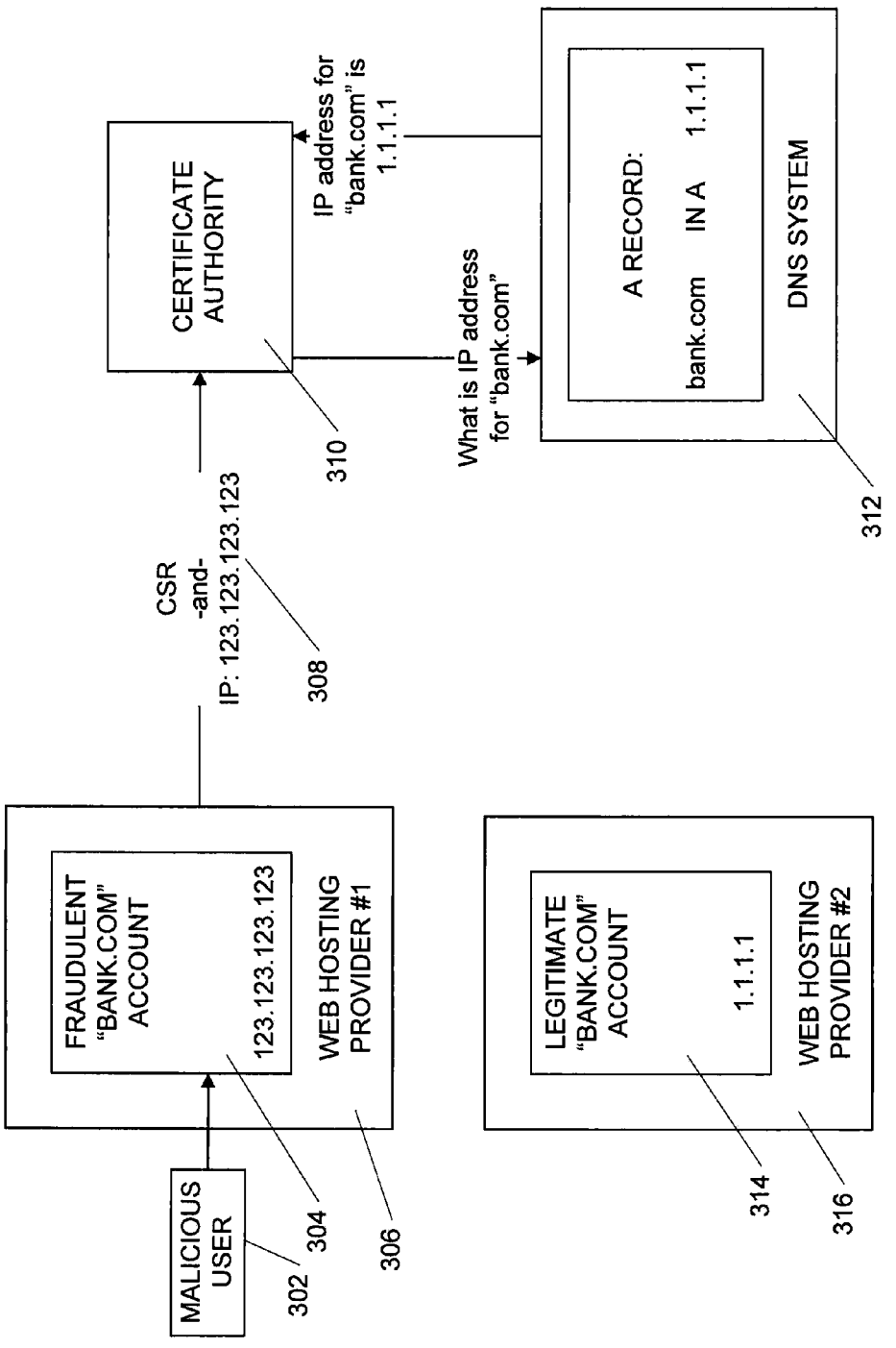
MALICIOUS USER
302
304
FRAUDULENT "BANK.COM" ACCOUNT
123.123.123.123
WEB HOSTING PROVIDER #1
306
CSR -and- IP: 123.123.123.123
308
CERTIFICATE AUTHORITY
310
IP address for "bank.com" is 1.1.1.1
What is IP address for "bank.com"
A RECORD:
bank.com IN A 1.1.1.1
DNS SYSTEM
312
LEGITIMATE "BANK.COM" ACCOUNT
1.1.1.1
314
WEB HOSTING PROVIDER #2
316

FIG. 3

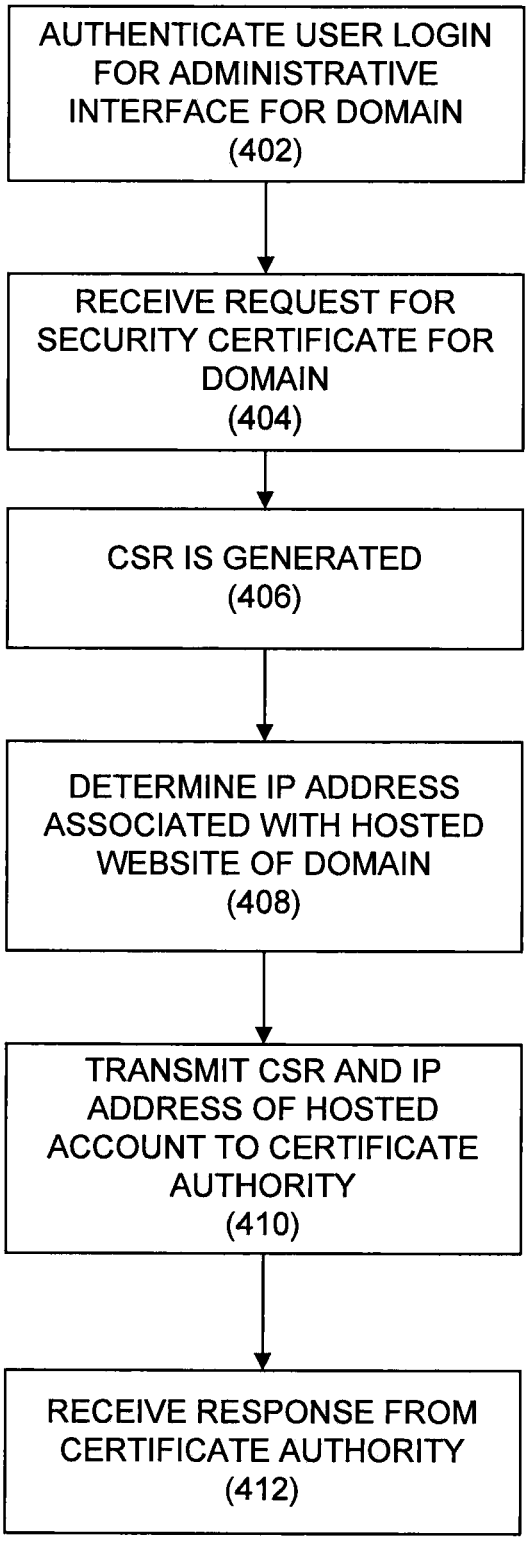
AUTHENTICATE USER LOGIN FOR ADMINISTRATIVE INTERFACE FOR DOMAIN (402)
RECEIVE REQUEST FOR SECURITY CERTIFICATE FOR DOMAIN (404)
CSR IS GENERATED (406)
DETERMINE IP ADDRESS ASSOCIATED WITH HOSTED WEBSITE OF DOMAIN (408)
TRANSMIT CSR AND IP ADDRESS OF HOSTED ACCOUNT TO CERTIFICATE AUTHORITY (410)
RECEIVE RESPONSE FROM CERTIFICATE AUTHORITY (412)

FIG. 4

METHOD FOR DOMAIN CONTROL VALIDATION

FIELD OF THE INVENTION

The present invention relates to a method for validating control of a domain.

BACKGROUND OF THE INVENTION

The Internet comprises a vast number of computers and computer networks that are interconnected through communication links. The interconnected computers exchange information using various services, such as electronic mail, Gopher, and the World Wide Web (WWW). The WWW service allows a server computer system (i.e., Web server or Web site) to send graphical Web pages of information to a remote client computer system. The remote client computer system can then display the Web pages. Each resource (e.g., computer or Web page) of the WWW is uniquely identifiable by a Uniform Resource Locator (URL). To view a specific Web page, a client computer system specifies the URL for the Web page in a request (e.g., a HyperText Transfer Protocol (HTTP) request). These follow the familiar format http://www.example.com uniquely identifying the particular resource. The request is forwarded to the Web server that supports that Web page to the client computer system. When the client computer system receives that Web page, it typically displays the Web page using a browser. A browser is a special-purpose application program that effects the requesting of Web pages and the displaying of Web pages.

The domain name system (DNS) is the world's largest distributed computing system that enables access to any resource in the Internet by translating user-friendly domain names to IP Addresses. The process of translating domain names to IP Addresses is called Name Resolution. A DNS name resolution is the first step in the majority of Internet transactions. The DNS is in fact a client-server system that provides this name resolution service through a family of servers called Domain Name Servers. The hierarchical domain space is divided into administrative units called zones. A zone usually consists of a domain (e.g., example.com) and possibly one or more sub domains (e.g., projects.example.com, services.example.com). The authoritative data needed for performing the name resolution service is contained in a file called the zone file and the DNS servers hosting this file are called the authoritative name servers for that zone. The DNS clients that make use of the services provided by authoritative name servers may be of two types. One type is called a stub resolver that formulates and sends a query every time it receives a request from an application that requires Internet service (e.g., a browser). The other type is called a caching (also called recursive/resolving) name server that caches the name resolution responses it has obtained from authoritative name servers and thus able to serve multiple stub resolvers.

Generally a web page's address or URL is made up of the name of the server along with the path to the file or the server. Rather than using a web hosting service's server name as their URL, most companies and many individuals and other entities prefer a "domain name" of their own choosing. In other words, the Ford Motor Company probably would prefer http://www.ford.com as its URL rather than, say, http://servername.com/.about.ford, where "servername" is the name of a Web hosting service whose server The Ford Motor Company uses. For this purpose then a "domain name," e.g. "ford" can be registered, if available, and the hosting service will use that URL for its customer's web address.

As is well known, the Internet is used every day to execute a large number of transactions, many of which can be of a sensitive or confidential nature. Monetary transactions, for example, often involve the communication of sensitive financial data that should not be divulged to third parties. Other transactions may involve trade secrets, personal information, and the like, that should not be publicly available. When sensitive information is communicated via the Internet, in certain circumstances, it is sometimes possible for malicious third parties to access that information. Two common schemes for accessing such information involve 1) the malicious user creating a web site that imitates the identity of another, trusted, entity, and 2) a man-in-the-middle attack, where the malicious user intercepts the sensitive communication.

The first type of fraud involves the malicious operator of a web site hiding or obscuring their identity from their customers. Essentially, the operator of a web site takes advantage of the anonymity provided by the Internet, thereby making it difficult for customers to locate and punish a fraudulent web site operator. For example, a web site may purport to be from a known and trusted business when the web site is in fact operated by an unscrupulous individual. The malicious user may try to receive credit card numbers or pass off goods and services under another's trademark as part of their fraudulent scheme.

To increase the perceived validity of the malicious user's false web site, the malicious user may have inserted false information in the WHOIS database when registering their false domain name in order to hide their identity.

The second type of fraud involves malicious individuals intercepting confidential information, such as credit card numbers, transmitted over the Internet between a customer and a legitimate web site. This type of fraud is less common and can be prevented by transmitting confidential information only in a sufficiently strong encrypted format.

A common method for Internet businesses to protect their customers from these two types of fraud is to obtain a secure certificate, such as a Secure Sockets Layer (SSL) certificate, for their web sites. A secure certificate, once installed on a web site, lets customers know that the owner of the web site (that is, the holder of the certificate) has been verified by a trusted third party (e.g., a certificate authority or CA) and that confidential communications with the web site are or, at least, can be encrypted. SSL is a protocol for transmitting private documents via the Internet. SSL protects confidential information by using a private key to encrypt data transferred over an SSL connection. Many, many applications support the SSL protocol, and many web sites use the protocol to communicate confidential information with their customers.

When connecting to a web site using the SSL protocol, the customer's browser accesses the web site's security certificate and retrieves information regarding the certificate authority that issued the web site's security certificate. The browser may then decide whether or not to trust the web site's security certificate based on which certificate authority issued the web site's security certificate, as well as other information contained within the security certificate.

Before a formal SSL certificate can be issued, a certificate authority is required to sign off on the identity of the holder of the certificate. As such, the certificate authority is required to confirm that the individual or business listed in the subject

field of the certificate actually exists and is accurately described within the certificate.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a block diagram showing an example environment in which the present system and method may be implemented.

FIG. **2** is a flowchart illustrating a method for performing domain control validation in accordance with the present disclosure.

FIG. **3** depicts an example data flow through the environment of FIG. **1** demonstrating the present method for domain control validation.

FIG. **4** is a flow chart illustrating a method for a web hosting provider to issue a CSR to a certificate authority in accordance with the present disclosure.

DETAILED DESCRIPTION

The present disclosure provides a system and method for verifying control of a domain. The system and method may be used, for example, as part of the domain control validation process utilized in conjunction with the issuance of security certificates.

In one implementation, the present disclosure provides a method including receiving, at a certificate authority, a request including a certificate signing request and a first Internet protocol address. The certificate signing request identifies a domain and a certificate. The method includes retrieving a second Internet protocol address for the domain from a domain name system, and when the first Internet protocol address is the same as the second Internet protocol address, signing the certificate, and transmitting the signed certificate to a requester of the request. When the first Internet protocol address is not the same as the second Internet protocol address, the method includes rejecting the certificate signing request.

In another implementation, the present disclosure provides a method including providing an administrative interface for a hosted account. The hosted account is associated with a domain and a hosted website for the domain. The method includes receiving, via the administrative interface, a request for a security certificate for the hosted website, and generating a certificate signing request for the hosted website. The certificate signing request identifies the domain. The method includes determining an Internet protocol address for the hosted website of the domain, transmitting the certificate signing request and the Internet protocol address to a certificate authority, and receiving a response to the certificate signing request from the certificate authority.

In another implementation, the present disclosure provides a system including at least one server computer having a processor and being configured to receive a request including a certificate signing request and a first Internet protocol address. The certificate signing request identifies a domain and a certificate. The at least one server computer is configured to retrieve a second Internet protocol address for the domain from a domain name system, and when the first Internet protocol address is the same as the second Internet protocol address, sign the certificate, and transmit the signed certificate to a requester of the request. When the first Internet protocol address is not the same as the second Internet protocol address, the at least one server computer is configured to reject the certificate signing request.

In another implementation, the present disclosure provides a system including at least one server computer having a processor and being configured to provide an administrative interface for a hosted account. The hosted account is associated with a domain and a hosted website for the domain. The at least one server computer is configured to receive, via the administrative interface, a request for a security certificate for the hosted website, and generate a certificate signing request for the hosted website. The certificate signing request identifies the domain. The at least one server computer is configured to determine an Internet protocol address for the hosted website of the domain, transmit the certificate signing request and the Internet protocol address to a certificate authority, and receive a response to the certificate signing request from the certificate authority.

FIG. **1** is a block diagram showing an example environment in which the present system and method may be implemented. Web hosting provider **100** is configured to host one or more websites **108** for the domains of a number of subscribers, such as subscriber **106**. Hosting provider **100** implements the hardware and software necessary to make the websites of subscribers of the services offered by hosting provider **100** available to users on the Internet.

In addition to providing website hosting services, web hosting provider **100** can provide administration services allowing subscriber **106** to modify one or more settings associated with the subscriber's website **108**, modify the content thereof, and request additional of fewer services associated with the subscriber's website **108**. Often these administration services are provided through web-based applications provided by the web hosting provider **100** and hosted by the servers of web hosting provider **100**. To utilize the applications, the subscriber **106** must first login to an appropriate administration interface using a password or other authentication token or combination of tokens. Once authenticated, the subscriber **106** can utilize the administration interface to modify settings associated with the subscriber's domain, including modifying the hosted website content, changes services associated with the domain, and the like. Generally, the login credentials of the subscriber **106** are associated with a particular website **108**, or collections of websites **108**.

For example, to enable communications through the website of subscriber **106** to be secured, subscriber **106** may utilize an administration interface supplied by the web hosting provider **100** to request secure communication services (e.g., SSL services) for the web site **108**. In one case, this request may be submitted through an appropriate web-based interface provided by hosting provider **100** using a computer accessible to subscriber **106** (e.g., the subscriber's computer).

In order to provide secure communication services, a security certificate is generated for the website of subscriber **106**. The certificate may include a key pair, including a private key (maintained in secrecy) and a public key (made publicly available on the website of subscriber **106**). With reference to FIG. **1**, therefore, the subscriber **106**, the web hosting provider **100**, or another entity associated with the website of subscriber **106** may generate the key pair. The public and private keys, as is known in the art, can be utilized to encrypt communications between a customer (and other users) and the website of subscriber **100** and form part of the security certificate.

Before a security certificate can be utilized to authoritatively identify a particular entity (e.g., the entity that is affiliated with a particular website), the certificate should be signed by a certificate authority, such as certificate authority **102**. In order to generate a signed security certificate for a particular website, therefore, a certificate signing request (CSR) is generated and transmitted to certificate authority **18**. The CSR includes a copy of the subscriber's certificate, as

well as additional information identifying the subscriber (or entity requesting that the certificate be signed) and the domain for which the certificate will be issued. The CSR represents a formal request that certificate authority **102** certify the identity of the purported certificate holder and, if that identity is certified, sign the public key included in the CSR. The CSR includes information describing the key pair as well as information describing the entity to whom the security certificate will be issued (i.e., the requester) as well as the domain being secured. Table 2, below, shows example contents of a CSR.

TABLE 1

Field	Description
Distinguished Name (DN)	The domain name being secured
Subject	The entity (either business or individual) associated with the certificate
Departmental Name/ Organizational Unit	A department of the Subject that may be associated with the certificate
Town/City	Location of the Subject
Province, Region, County, or State	Location of the Subject
Country	Country of the Subject
Email Address	Email address for the Subject

Upon receipt of the CSR, certificate authority **102** attempts to verify the identity of the requester by, for example, asking for copies of identification documents or by asking for information not publicly available regarding the requester. If the identity of the requester was successfully verified, the certificate authority **102** creates and signs the certificate, which is then transmitted to subscriber **106** or hosting provider **108**. The signed security certificate can then be installed on subscriber **106**'s web site **14**.

Once the signed certificate is installed on website **108**, a third party, such as a customer of subscriber **106** desiring to purchase goods and services from subscriber **106**, may use a browser to access the subscriber's SSL-compliant web site **108**. The browser will request from the web site **108** the web site's signed SSL certificate, which includes the identity of the certificate authority that issued the certificate. Browsers that support the SSL protocol have a list of trusted certificate authorities and the browser will compare the certificate authority that issued the certificate to the list of trusted certificate authorities. This procedure allows the customer's browser to both inspect and verify the identity of the holder of the certificate and ensure that the holder's identity has been validated by a trusted source.

In some implementations, certificate authority **102** and web hosting provider **100** can have a trusted relationship. That is, web hosting provider **100** may have demonstrated to certificate authority **102** that it can be trusted to provide none-fraudulent information to certificate authority **102** with a CSR or in conjunction with the transmission of the same. In some cases, this trust relationship can be developed by certificate authority **102** performing an investigation into web hosting provider **100** (e.g., checking business credentials, interviewing business leaders and/or owners, investing business history, investigating in place security procedures and mechanisms, reviewing hiring practices, and the like). Alternatively, the trusted relationship may be established because both web hosting provider **100** and certificate authority **102** are, in fact, the same entity or managed by the same entity. In some cases, certificate authority **102** may also trust requests issued by a web hosting provider regardless of whether a pre-existing trusted relationship exists.

In some cases the trusted relationship enables the certificate authority to delegate some of its responsibilities to the web hosting provider, which can operate as an affiliate of the certificate authority. In such a case, the processes employed by the certificate authority in delegating such responsibility may be required to satisfy various process and/or qualification requirements as set out by a body responsible for governing the issuance of SSL certificates. For example, the certificate authority may additionally undertake to verify that the delegated-to web hosting provider's personnel involved in the issuance of a certificate meet certain training and skills requirements.

In establishing the trusted relationship, certain expectations can be set for the operations of the web hosting provider. For example, the terms of the relationship may require that the web hosting provider prevent the creation of multiple web hosting accounts that all claim to be associated with the same domain (e.g., multiple users cannot each create accounts for the domain 'bank.com' with the same web hosting provider). If this restriction were not in place, the multiple accounts could each potentially be hosted on the same server having the same IP address. In that case, both non-fraudulent and fraudulent accounts could share the same IP address.

Another restriction that may be put into place as part of the trusted relationship may that the web hosting provider exercise full control of the servers the provider uses to host content. This restriction ensures that multiple, different, web hosting providers cannot each host web sites that are stored on the same server (and therefore have the same IP address). This would prevent two different accounts that are each associated with different web hosting providers from being associated with the same IP address (should the two web hosting providers utilize the same server to host content). If that condition were permissible, a fraudulent account (mimicking a non-fraudulent account with a first hosting provider) could be created on a second hosting provider, where both the first and second hosting providers use the same server (and therefore IP address) to host content. In such a case, both the fraudulent and non-fraudulent accounts would be associated with the same IP address.

Referring to FIG. **1**, the depicted environment includes DNS system **104**. DNS system **104** communicates via en electronic network (e.g., the Internet) to perform Name Resolution activities.

Because a security certificate, once signed by a certificate authority, is trusted by the general public, it is important that the entity identified in the CSR be verified as the entity in control of the domain. Without such a validation, it may be possible for individuals to request signed certificate for domains that belong to other entities. For example, an individual having nothing to do with the organization may request a signed certificate for a bank's domain (e.g., bankofamerica.com). If the certificate authority should fail to detect that the individual issuing the CSR is not in control of that domain and should sign the certificate in the CSR, that individual may then be able to use that signed certificate to fool others into believing that they are communicating with bankofamerica.com.

A number of techniques exist for validating that entities submitting CSRs are the controlling entities for the domains identified in the CSR. In some cases, upon receiving a CSR, the certificate authority will access WHOIS records for the identified domain to identify the administrative contact for the domain. The certificate authority can then communicate with the identified administrative contact (or any other contact listed in the WHOIS records) to verify that the CSR is valid and requested by the administrative contact, or another

appropriate entity. Alternatively, the certificate authority can demand that the requester modify the DNS records associated with the domain in order to demonstrate that the requester has sufficient control over the domain to properly issue the CSR. Another technique involves demanding that the requester modify content hosted at the domain identified in the CSR. If the requester is able to modify the hosted content (e.g., by inserting a hidden code into the web page) that modification demonstrates that the requester has sufficient control to properly issue the CSR.

These existing techniques all require that the requester of the CSR take some specific action to demonstrate to the certificate authority sufficient control for the certificate authority to sign the certificate.

In the present system and method, a certificate authority can validate that the requester of a CSR has control over the identified domain without requiring additional actions from the requester, in contrast to existing validation mechanisms.

FIG. **2** is a flowchart illustrating a method for performing domain control validation in accordance with the present disclosure. The method illustrated in FIG. **2** may be executed in the environment depicted in FIG. **1**, though it will be appreciated that other environments may instead be utilized.

In step **202** subscriber **106** logs into an administration account for a host account that is associated with a domain (e.g., example.com) and has a website hosted by web hosting provider **100**. This login procedure requires that subscriber **106** provide authentication credentials (e.g., password, one-time use token, and the like) before subscriber **106** will be granted access to the administration account. Because subscriber **106** is required to provide acceptable credentials before access is granted, the act of the user logging-in to the administration interface in step **202** indicates that the subscriber is an authorized user having sufficient rights to modify settings associated with the account and, thereby, can request a signed certificate for the domain.

Accordingly, in step **204** subscriber **106**, having logged into the administration account requests a signed security certificate for the domain associated with the administration account. This request may be initiated, for example by the subscriber initiating a request through the administration interface provided by web hosting provider **100**. In step **206**, a CSR is generated for the subscriber's domain. The content of the CSR may be collected from one or more user databases (such as customer information databases) maintained by the web hosting provider. Alternatively, subscriber **106** may be prompted to supply the information necessary to complete the CSR.

In step **208**, web hosting provider **100** transmits the CSR generated in step **206** to certificate authority **102** for consideration. Along with the CSR, web hosting provider **108** also transmits the IP address of the subscriber's hosted account. Because web hosting provider **108** hosts the subscriber's domain, this IP address will point to one of the web servers of web hosting provider **108** that is currently hosting the website of the subscriber's domain. The IP address of the subscriber's hosted account, therefore, is determined by, and in the control of, web hosting provider **108**. The subscriber cannot select or designate the IP address that will be utilized to host the subscriber's account.

After receiving both the CSR and IP address of the associated website, certificate authority **102** inspects the CSR to determine the domain name for which the security certificate is requested. Certificate authority **102** then accesses DNS system **104** to identify the IP address stored in the DNS system **104** for the domain. The IP address received from DNS system **104** is then compared to the IP address provided by web hosting provider **100** in step **210**.

If the IP address received from DNS system **104** matches the IP address received from web hosting provider **100** in step **208**, it is determined that the subscriber is authorized to request the signed security certificate. As such, in step **212** certificate authority **102** will sign the certificate contained within the CSR and return the signed certificate to web hosting provider **100**. The signed certificate may then be installed into the subscriber's website and utilized to enable secure communications with the same.

If the IP address received from DNS system **104** does not match the IP address received from web hosting provider **100** in step **208**, it is determined that the subscriber is not authorized to request the signed security certificate and the request is rejected. In the case that a request is rejected, a notification may be transmitted to the web hosting provider containing information explaining why the request was rejected.

In some cases, when the IP addresses do not match and the request is rejected, alternative methods of domain control validation (such as by issuing an email to an administrative contact identified in WHOIS records or prompting the requester to modify a DNS entry associated with the domain or modify web content hosted at the domain) may be utilized in an attempt to complete the signing request.

In general, the method illustrated in FIG. **2** establishes two criteria that must be met before a security certificate can be signed by a certificate authority, namely 1) that the requester has sufficient authority to request a signed certificate for the target domain that is hosted on the web hosting provider, and 2) that the target domain identified in the CSR is actually hosted with the web hosting provider. The satisfaction of these two criteria prevents a malicious user from creating a fake account with a hosting provider that claims to be the hosting account for another entity's domain. FIG. **3** depicts an example data flow through the environment of FIG. **1** demonstrating the present method for domain control validation.

As shown in FIG. **3**, a malicious user **302** may wish to acquire a signed security certificate for the domain "bank-.com". In an attempt to acquire the certificate, the malicious user **302** creates an account **304** with a first web hosting provider **306**. The account **304** created by malicious user **302** purports to be the hosted account for "bank.com". As shown in FIG. **3**, the IP address of the hosted account is 123.123.123.123, which is an IP address that refers to one of the server utilized by web hosting provider **306** to host the account **304** and its content.

The correct bank.com account **314** is, in fact, hosted by a different hosting provider **316**. The IP address of the correct bank.com account **314** is 1.1.1.1, which is also stored in the records of DNS system **312**.

Once the malicious account **304** is created. The user **302** may then attempt to request, through web hosting provider **306**, a signed certificate for the false account **304**. For example, user **302** may log into an administrator account for account **304** via an administrative interface provided by web hosting provider **306**. Using the administrative account, user **302** may be able to initiate a request for a signed certificate for the domain associated with account **304**. If the signed certificate is ultimately issued, the user **302** will be in possession of a valid, signed certificate for the domain "bank.com". The present method prevents a malicious requester from acquiring such a fraudulent certificate.

In the present system and method, the first criterion is satisfied by the web hosting provider **306**. For example, through the execution of step **202** of FIG. **2** (the requester logging into an administration account associated with the

hosted domain), the web hosting provider **306** can determine that the user **302** is an administrator for the hosted account **304**. In the present example, the malicious user **302** is an administrator for the account associated with the fraudulent "bank.com" domain (after all, the user **302** created the account). Accordingly, after logging into the hosting provider's **306** administrative account, the user **302** is able to request a signed certificate through web hosting provider **306**.

The second criterion is then satisfied by the certificate authority (for example, in step **210** of the method of FIG. **2**). Accordingly, if the certificate authority has a trusted relationship with the web hosting provider, the certificate authority can determine whether both criteria are satisfied without any additional input from the requester.

In the present example, after the signed certificate is requested by the malicious user, a CSR is transmitted to the certificate authority **310**. As described in step **208** of FIG. **2**, the CSR is transmitted along with the IP address of the malicious bank.com domain of the hosting provider (see arrow **308**). Upon receiving the CSR, the certificate authority **310** issues a request to DNS system **312** to retrieve the IP address for the domain identified in the CSR (i.e., bank.com). DNS system **312** then responds with its stored IP address (in this case, 1.1.1.1). Certificate authority **310** can then compare the IP address of the fraudulent bank.com account (received along with the CSR) and compare that IP address to the IP address of the correct bank.com domain (retrieved from DNS system **312**). Because the two IP addresses will not match, the request can be rejected.

In some cases, to provide load balancing websites may be hosted on a number of different servers or are otherwise addressable by a number of different IP address. For example, in a round-robin DNS configuration, DNS servers are configured to return one of a number of candidate IP addresses for a particular domain in response to a lookup request. By returning different IP addresses in response to lookup requests, the requests issued to the domain can be spread out amongst a number of different servers, lessening the load on one particular server.

With regards to the present disclosure, if it is the case that the domain for which a CSR is issued can be accessed through a number of different IP addresses, in step **208** of FIG. **2**, all of those potential IP addresses are forwarded to the certificate authority. After determining that the incoming request received from the web hosting provider includes multiple IP addresses, the certificate authority is put on notice that a number of IP addresses may be associated with the domain in question.

Accordingly, in step **210** the certificate authority, having been put on notice that the domain in question may be referred to by a number of IP addresses, may retrieve a listing of all IP addresses associated with the domain from DNS system **104** (though in other implementations, only a single IP address may be retrieved from the DNS system and then compared to the listing provided by the web hosting provider). Then, if one of the IP addresses in the list received from web hosting provider **100** matches one of the IP addresses in the list received from DNS system **104**, the certificate authority signs the certificate and returns the signed certificate to web hosting provider **100**. If there is no match, it is determined that the subscriber is not authorized to request the signed security certificate and the request is rejected.

FIG. **4** is a flow chart illustrating a method for a web hosting provider to issue a CSR to a certificate authority in accordance with the present disclosure. In step **402** a user attempting to login to an administrative interface for a particular domain is authenticated. This may involve the web hosting provider collecting a username and password for a user and authenticating the user based upon the combination of username and password. In other implementations, different security tokens may be used.

If the user is authenticated, in step **404** a request is received from the user for a security certificate for a domain that is under the control of the authenticated user via the administrative interface. In step **406**, after receiving the request a CSR is created for the domain.

In step **408**, all IP addresses for the hosted account or website for the domain are identified. In this step, the web hosting provider hosting the user's account will generate a list of the IP addresses that identify servers upon which the user's website may reside. In some cases this will be a single IP address, but, as described above, in some server implementations the list may include multiple IP addresses.

In step **410** the CSR generated in step **406** and the list of IP addresses generated in step **408** are transmitted to a certificate authority. The certificate authority can use the information transmitted in this step to determine whether a security certificate should be issued in response to the request. Accordingly, in step **412** a response is received from the certificate authority. If the one of the IP addresses transmitted in step **410** matching an IP addresses stored for the domain in a DNS system, the response may include a signed certificate. If there is no match, the response may include an indication that the request was denied.

As a non-limiting example, the steps described above (and all methods described herein) may be performed by any central processing unit (CPU) or processor in any computer or computing system, such as a microprocessor running on a server computer, and executing instructions stored (perhaps as applications, scripts, apps, and/or other software) in computer-readable media accessible to the CPU or processor, such as a hard disk drive on a server computer, which may be communicatively coupled to a network (including the Internet). Such software may include server-side software, client-side software, browser-implemented software (e.g., a browser plugin), and other software configurations.

The present disclosure describes preferred embodiments with reference to the Figures, in which like numbers represent the same or similar elements. Reference throughout this specification to "one embodiment," "an embodiment," or similar language means that a particular feature, structure, or characteristic described in connection with the embodiment is included in at least one embodiment of the present invention. Thus, appearances of the phrases "in one embodiment," "in an embodiment," and similar language throughout this specification may, but do not necessarily, all refer to the same embodiment.

The described features, structures, or characteristics of the invention may be combined in any suitable manner in one or more embodiments. In the description, numerous specific details are recited to provide a thorough understanding of embodiments of the invention. One skilled in the relevant art will recognize, however, that the invention may be practiced without one or more of the specific details, or with other methods, components, materials, and so forth. In other instances, well-known structures, materials, or operations are not shown or described in detail to avoid obscuring aspects of the invention.

The schematic flow chart diagrams included are generally set forth as logical flow-chart diagrams. As such, the depicted order and labeled steps are indicative of one embodiment of the presented method. Other steps and methods may be conceived that are equivalent in function, logic, or effect to one or more steps, or portions thereof, of the illustrated method.

Additionally, the format and symbols employed are provided to explain the logical steps of the method and are understood not to limit the scope of the method. Although various arrow types and line types may be employed in the flow-chart diagrams, they are understood not to limit the scope of the corresponding method. Indeed, some arrows or other connectors may be used to indicate only the logical flow of the method. For instance, an arrow may indicate a waiting or monitoring period of unspecified duration between enumerated steps of the depicted method. Additionally, the order in which a particular method occurs may or may not strictly adhere to the order of the corresponding steps shown.

The present invention has been described in terms of one or more preferred embodiments, and it should be appreciated that many equivalents, alternatives, variations, and modifications, aside from those expressly stated, are possible and within the scope of the invention.

The invention claimed is:

1. A method, comprising:

receiving, at a certificate authority from a web hosting provider, a request including a certificate signing request and a first plurality of Internet protocol addresses of a hosted account of a subscriber of the web hosting provider, the certificate signing request identifying a domain associated with the subscriber and a certificate;

retrieving a second plurality of Internet protocol addresses for the domain from a domain name system;

when a first one of the first plurality of Internet protocol addresses is the same as a first one of the second plurality of Internet protocol addresses:

signing the certificate to generate a signed certificate, and

transmitting the signed certificate to a requester of the request; and

when each one of the first plurality of Internet protocol addresses are different from each one of the second plurality of Internet protocol addresses:

rejecting the certificate signing request; and

initiating an alternative method for performing domain control validation for the domain.

2. The method of claim **1**, wherein the certificate authority and the web hosting provider have a pre-established trusted relationship.

3. The method of claim **1**, wherein the certificate authority and the web hosting provider are the same entity.

4. The method of claim **1**, wherein the certificate authority and the web hosting provider are different entities.

5. The method of claim **1**, wherein rejecting the certificate signing request includes transmitting a notification to the web hosting provider.

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